ECONOMIC ANALYSIS

A. The Project

1. The Second Lower Secondary Education for the Most Disadvantaged Areas Project will assist the Government of Viet Nam in creating strategic and long-term changes to further develop the country's lower secondary education (LSE) and human resources in order to sustain the achievements of the first Lower Secondary Education for the Most Disadvantaged Regions Project.[1] The second project will have a substantial strategic impact on the three key dimensions of LSE in the most disadvantaged regions: access and equity, quality and relevance, and efficiency and sustainability.

2. **Output 1: Access to lower secondary education and equivalency program increased.** Interventions under this output will increase LSE enrollments in the project provinces. A total of 660 new classrooms, 100 subject rooms, 70 libraries, and 350 semi-boarding facilities will be constructed or improved. This will allow LSE schools to accept more enrollees every year, estimated at 33,480 new LSE students. An additional 33,471[2] LSE students are likewise expected to be encouraged to enroll annually as a result of the project's awareness building program on the importance of LSE. In all, a total of 66,951 new students are expected to enroll yearly due to the project. The average net enrollment rate (NER) is expected to rise to about 90% from 84% before the project. Dropout rates, on average, are expected to decrease from 2.4% to 1.8%, while promotion rates are envisioned to improve from 94.5% to 97.7% and completion rates from 98.4% to 99.5%. Moreover, the provision of toilet facilities will benefit 432,000 students through better sanitary conditions in lower secondary schools (LSSs), which will reduce the incidence of waterborne gastrointestinal diseases among students.[3]

3. **Output 2: Teaching and learning tools decentralized.** Interventions will improve the quality of LSE graduates by providing them with better knowledge and skills in preparation for higher education. About 30,500 LSS teachers will be trained including 6,000 teachers on life skills education, 1,600 teachers on vocational counseling and guidance techniques and services, and 1,000 teachers in coastal areas trained in disaster management education. Stronger teacher capacity in teaching methods and approaches, as well as improvements in instructional materials, will enhance teaching delivery, thereby improving student performance. A new curriculum for disaster management education will be introduced to help improve living and school conditions in typhoon-affected coastal areas. The project will also construct buildings that can withstand typhoons and floods, and serve as shelters for residents. These interventions will improve the capacity of residents to cope with the impacts of natural calamities, reducing losses of life and property caused by strong typhoons every year

4. **Output 3: New school clustering established.** School clustering and the provision of block grants for selected LSSs will empower officials and staff of beneficiary schools and communities to carry out initiatives to improve their respective schools based on their own needs and plans. The establishment of a strong network among schools and communities will facilitate cooperation in the use of school resources and, in turn, provide a framework for greater decentralization of financial management to schools. This will improve the efficiency of LSSs.

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[1] Asian Development Bank (ADB). 2007. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Socialist Republic of Viet Nam for the Lower Secondary Education for the Most Disadvantaged Regions Project*. 2007. Manila.

[2] This is about 1.5% of the total number of children in the project area that are within the age group eligible for LSE.

[3] There is a causal link between poor sanitation and the incidence of waterborne diseases (World Health Organization, n.d. Water and Public Health, WHO Seminar Pack for Drinking-Water Quality, http://www.who.int/water_ sanitation health/dwq/en).

5. **Output 4: Project implementation and monitoring and evaluation capacity enhanced.** The project will improve project management and implementation through activities under this output. Training of education planners, school principals, and administrators on project implementation will ensure that the proposed project is implemented on time and within budget.

B. Contribution of Project to Net Enrolment Rate in Project Area

6. The current NERs for grades 6–9 in the areas covered by the project are estimated at 83% in the northern midland and mountainous and central highland areas, 79% in the Mekong River Delta area, and 92% in the central north and central coastal area. This yields a project average of 84% (Table 1).

Table 1: Contribution of Project to Net Enrollment Rate in the Project Area[a]

Region	Children in Age Group Belonging to LSE Level[b]	Total Students Enrolled in Grades 6–9[b]	Net Enrollment Rate Before Project[b]	Additional Enrollments due to Project[c]	Total LSE Enrollment due to Project[c]	New NER due to Project[c]	Increase in NER due to Additional Students[c]
Northern Midland and Mountainous Area	573,308	475,754	83%	15,756	491,510	86%	3%
Central Highland Area	316,357	262,165	83%	9,991	272,156	86%	3%
Mekong River Delta Area	296,671	234,778	79%	8,483	243,261	82%	3%
North Central and Central Coastal Area	1,088,384	1,000,432	92%	32,721	1,033,153	95%	3%
Average/Total	2,274,719	1,973,129	84%	66,951	2,040,080	90%	6%

[a] 28 provinces.
[b] Obtained from the Ministry of Education and Training, Department of Planning and Finance.
[c] Consultant estimates.

7. In the project area, student enrollment is envisioned to increase by about 66,951 students as a result of (i) improvement and construction of 660 classrooms, which will accommodate an additional 29,700 students; (ii) construction of semi-boarding facilities, which will house 3,780 students; and (iii) awareness building program on the importance of LSE, which will encourage an additional 33,471 potential LSE students to attend school. As a consequence, total LSE student enrollment will increase from 1,973,129 to 2,040,080 students, for an overall NER of 90% in the project area. The contribution of the project to overall NER of the four regions is about 6% (Table 1).[4]

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[4] In the northern midland and mountainous area, enrollment is expected to increase from 475,754 to 491,510 students; in the central highland area, from 262,165 to 272,156 students; in the Mekong River Delta area, from 234,778 to 243,261 students; and in the central north and central coastal area, from 1,000,432 to 1,033,153 students. NERs are expected to increase from 83% to 86% in the northern midland and mountainous and central highland areas; from 79% to 82% in the Mekong River Delta area; and from 92% to 95% in the central north and central coastal area. An enrolment rate falling short by 20% of target will result in an NER of 89% for the whole project, 85% for the northern midland and mountainous area, 85% for the central highland area, 81% for the Mekong River Delta area, and 94% for the central north and central coastal area.

C.   Economic Analysis

1.   Assumptions Used in the Economic Analysis of the Project

8.   The economic analysis is carried out by applying ADB's Guidelines for Economic Analysis of Projects.[5] The following key assumptions are used in the economic analysis: (i) economic costs are in constant early 2014 prices and estimated using the world price numeraire method; (ii) a standard conversion factor of 0.9 and a shadow wage rate factor of 0.8 are applied;[6] (iii) total project capital investment cost (excluding price contingencies, interest charges, fees, and taxes) are spread over the 6 years of project implementation; (iv) incremental operation and maintenance (O&M) cost is at 3.0% of total capital cost; (v) replacement of equipment is carried out every 5 years; (vi) recurrent cost of LSE schools for each of the four regions and the project is based on an average cost of D5.88 million per student per year, adjusted to its 2020 economic value, and multiplied by the estimated number of students to arrive at the value of recurrent cost for each region and the whole project; (vii) opportunity cost of LSE students is based on D1,960,827 per student per year;[7] (viii) project life is 25 years; (ix) the number of students completing the LSE requirements will remain at 2023 levels throughout project life; and (x) a discount rate of 12% is applied in the calculation of project economic internal rate of return (EIRR).

2.   Quantification of Project Benefits

9.   **Improved future income-generating capacity of lower secondary education graduates.** LSE graduates who do not have the opportunity to seek higher education are expected to join the labor market and look for jobs. With improved knowledge and skills, their potential salary will be higher than that of other job-seekers who have not attended LSE. A study conducted in Viet Nam estimated that 1 year of education increases the average earning capacity of an individual by 11%. For students who have completed the 4-year LSE requirements, this means that they have about 45% greater potential earning capacity compared with those with only primary education.[8] In quantifying the benefits generated by employed LSE students resulting from the project, the annualized net present value (NPV) of the future incremental income stream of the additional number of LSE students (66,951 students)[9] was estimated over a period of 20 years, during which they were assumed to remain employed.[10] The incremental future earnings of students who have completed LSE is estimated based on the difference in the earnings of one who completed LSE, estimated at D13.7 million per person per year, and one with only primary education, estimated at

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[5]   ADB. Guidelines for the Economic Analysis of Projects. Manila. February 1997.

[6]   ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Socialist Republic of Viet Nam for the Productive Rural Infrastructure Sector Project in the Central Highlands*. Manila.

[7]   J. Gallup, 1995. *The Economic Value of Children in Viet Nam.* Hanoi. (Institutes of Economics and Sociology, Tran Xuan Soan, Viet Nam, September). The value of wage earnings of LSE students is based on a study by Gallup, which estimated that the average wage rate of child labor was D896 per hour in 1995. Based on an employment rate of 50%, by providing some time for other activities that children normally are involved in (e.g., play time and other non-income generating activities), the adjusted average rate (opportunity cost) is estimated at D448 per hour. Adjusting for inflation, the average wage rate, in 2014 value, is estimated at about D6,536 per hour or about D26,144 a day, for a 4-hour work-day, or about D1,960,827 per year.

[8]   Nguyen Xuan Thanh. 2006. *Estimating the Return to Education in Viet Nam: A Difference-in-Difference Approach*. Cambridge, MA: John F. Kennedy School of Government. This is an updated version of a research paper written by the author in December 2005 at the John F. Kennedy School of Government, Harvard University, Cambridge, MA, USA.

[9]   This refers to the new students entering grade 6 every year. In the northern midland and mountainous area, 15,756 new students are estimated at; in the central highland area, about 9,991 students; in the Mekong River Delta area, 8,483 students; and in the central north and central coastal area, 32,721 students.

[10] The employment rate of LSE graduates is assumed to be 61%. http://www.indexmundi.com/facts/vietnam/labor-participation-rate.

D9.4 million per person per year.[11] The total benefits accruing to the project comprise the total value of the incremental benefits generated by an employed LSE student over his or her 20-year employment period, multiplied by the number of LSE students gaining employment. For the project as a whole, students who completed all LSE requirements and are able to find employment are expected to generate accumulated incremental income earnings of about D26,859.42 billion in economic terms during 2020–2039.

10.   **Improved management of lower secondary education schools.** The strengthened planning and management capacity of school principals and the staff of Ministry of Education and Training (MOET), Department of Education and Training, and Bureau of Education and Training will improve the efficiency of school operations and the delivery of educational and/or instructional services in disadvantaged areas. Consequently, these will improve cost effectiveness by increasing capacity utilization of LSE schools, reducing the unit cost of financing LSE students. Greater efficiency in the use and management of education resources is envisioned to decrease the unit cost per student by 54% from D11.46 million per student per year to D5.30 million per student per year. The estimated financial benefits from improved LSE efficiency is estimated at about D767.39 billion (D690.65 billion in economic terms) in 2020 and increasing to D4,693.28 billion (D4,223.95 billion in economic terms) in 2039. Total economic benefits from improved efficiency is about D39,556.98 billion for 2020–2039.[12]

11.   **Improved sanitation and hygienic conditions.** The provision of sanitation facilities is expected to contribute to better sanitation and hygienic practices in LSE schools, which will improve health conditions among students.[13] The expression of these benefits in monetary terms is based on a cost of medical treatment of D2.6 million per person per episode and an incidence rate of gastrointestinal diseases of 0.345%, which is envisioned to decrease by about 50% to about 0.1725% because of the project. The total cost of medical treatment under the "without project" scenario is estimated at D6.92 billion a year. Under the "with project" scenario, this is expected to decrease to D3.46 billion a year. The total accumulated medical cost during 2020–2039 is expected to decrease from D127.98 billion to D58.11 billion.[14]

12.   **Improved climate resilience in typhoon-affected coastal areas.** About six destructive typhoons are expected to affect these coastal areas every year, causing an average annual cost of damage of about D88.48 billion. Although the targeted typhoon-affected coastal area is expected

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[11] Consultant estimates are based on interviews conducted during the project preparatory technical assistance. The Detailed Economic Analysis is accessible from the list of linked documents in Appendix 2.

[12] This was estimated by multiplying the reduced cost per student by the total number of students under the "with project" scenario. For example, the estimated incremental benefits for 2020 from improved cost efficiency in LSE schools was based on the difference between the annual cost of financing one LSE student, estimated at about D11.46 million per student per year (under the "without project" scenario) and the annual cost of one LSE student of about D5.30 million per student per year (under the "with project" scenario), multiplied by the total number of students under the "with project" scenario in the same year. This is carried out for each year over a projection period of 20 years.

[13] The World Health Organization (WHO) reports that improving water supply and sanitation can have a significant impact on human health. Potential reductions in morbidity as a result of improvements in water supply and sanitation ranges from 40% to 50% for diarrheal diseases, dysentery, and gastroenteritis. http://www.who.int/water_sanitation_health/publications/factsfigures04/en/

[14] The total number of cases of diarrheal disease in 2009 in Viet Nam was estimated at 296,000. The total population of the country at that time was 85,789,573 people, yielding an incidence rate of 0.345%. http://www.who.int/maternal_child_adolescent/epidemiology/profiles/neonatal_child/vnm.pdf?ua=1. Because of the lack of information on the incidence of diarrheal diseases in the project provinces, an incidence rate of 0.345% was applied in the economic analysis. The actual incidence rate in these provinces may be higher because of poor and/or unavailable water and sanitation facilities. Given this situation, the health benefits resulting from the project's interventions to reduce the incidence of diarrheal diseases will be higher, had actual data been available for the economic analysis.

to be completely resilient to the impacts of climate change, it is assumed that damages from destructive typhoons will be reduced by 50% every year.[15]

3. Estimation of Costs

13. Economic costs are at constant early 2014 prices and measured using the world price numeraire method. Specific costs are project investments, O&M, and replacement costs. Local cost components, such as non-traded and labor cost components, are converted into economic values using a standard conversion factor of 0.9 and a shadow wage rate factor of 0.8. Foreign cost components are mainly traded components, and their financial value is assumed to be equal to their respective economic values. Incremental annual O&M cost is assumed at 3.0% of capital investment costs.[16] Recurrent budgets for each of the four regions and the project are based on 2013 MOET estimates, adjusted to their 2020 economic values, and projected over 20 years (2020–2039) at an annual growth rate of about 10%. Estimates of opportunity costs of LSE students are based on average annual earnings that they would have made in jobs over 4 years while attending LSS.

4. Economic Internal Rate of Return and Sensitivity Analysis

14. The project's EIRR is estimated at 19.9%, well above the economic opportunity cost of investment of 12%, indicating that the project is economically viable. The project is also considered resource-efficient based on its benefit–cost ratio of 1.2, which is greater than 1.[17] The sensitivity analysis indicates that the EIRR is sensitive to changes in costs and enrollment, as the sensitivity indicator values for these change variables are significantly greater than 1. Switching values confirms the sensitivity of EIRR to changes in these variables.[18]

5. Poverty Impact Analysis.

15. The poverty impact analysis was based on the distribution of incremental benefits and costs generated by project investments. Incremental benefits are generated from (i) greater income-generating capacity of LSE students, (ii) better management of LSE schools, (iii) improved sanitation in LSE schools, and (iv) greater climate resilience of communities in the typhoon-affected coastal areas. The analysis indicates that 41% of total project benefits are shared by the poor. In the northern midland and mountainous area, where poverty incidence is high, about 88% of the benefits accrue to the poor. The share of the poor is 50% in the central highland area, 25% in the Mekong River Delta area, and 26% in the central north and central coastal areas.[19]

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[15] Discussions with civil engineers during the project preparatory technical assistance indicated that it is possible to experience no damages during typhoons in the coastal area provided climate-proofing measures are in place. However, damage could occur depending on the strength of the typhoon, ranging from 10% to 50% annually. For the economic analysis, an annual damage of about 50% was assumed.

[16] It is standard practice in Viet Nam to assume 2%–3% of total investment cost as incremental O&M costs for infrastructure and/or construction projects. For the economic analysis, 3% was applied to cover the O&M of buildings and other types of investments such as equipment and furniture.

[17] The calculated EIRR values are as follows: 16.7% for the northern midland and mountainous area, 22.3% for the central highland area, 19.6% for the Mekong River Delta area, and 20.9% for the central north and central coastal areas. A benefit–cost ratio of 1.2 was estimated for all project areas. The detailed Economic Analysis is accessible from the list of linked documents in Appendix 2.

[18] The summary of the sensitivity analysis results are the Detailed Economic Analysis, accessible from the list of linked documents in Appendix 2.

[19] Poverty incidence rates for ethnic minority and ethnic majority populations in each region were obtained from World Bank. 2012. *Viet Nam Poverty Assessment*. Hanoi. The Detailed Economic Analysis is accessible from the list of linked documents in Appendix 2.